NEGATIVE ELECTRODES FOR LITHIUM SECONDARY CELLS MADE OF A THIN FILM OF SIOx

Examiner: K. Han SN: 10/554,397 Art Unit: 1795 June 11, 2010

Detailed Action

1. The Applicant's amendment filed on March 23, 2010 was received. Claim 2 was cancelled. Claim 1 was amended. Claim 19 was added.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. The objection to the specification has been withdrawn in view of the Applicant's amendment to the title.

Claim Rejections - 35 USC § 103

4. Claims 1, 4, 5, 7, 12, 14, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. (JP 2002-042809, machine translation) in view of Yamamoto et al. (US 2003/0054249).

Regarding claims 1, and 7, Hara is directed towards a lithium secondary battery (Abstract) comprised of a negative electrode [0013] having a thin film of silicon oxide on the surface of a collector [0016] but is silent towards the film being formed by vacuum vapor deposition or sputtering and having a thickness from 0.1 to 50μm.

Yamamoto teaches a lithium secondary battery where a silicon oxide film layer is formed by vapor deposition and sputtering for an anode layer [0100, 0101] and the anode layer thickness may be between 30 to 300 microns [0099] which affects the charge-discharge efficiency (Figure 9, 10). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the silicon oxide layer of Hara using vapor deposition or sputtering because Yamamoto teaches this as preferable methods to form an amorphous layer with homogeneous film quality and an even film thickness. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a minimum value of the active material oxide layer for Hara because Yamamoto recognizes the silicon oxide layer affects the charge-discharge efficiency. Furthermore, regarding the anode layer thickness, it has been held that where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (MPEP 2144.05).

Regarding claims 4 and 5, Hara discloses the value of x less than 2.0 [Abstract, 0009]. It has been held that where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (MPEP 2144.05)

Regarding claim 12, Hara is directed towards a fabricating method for a lithium secondary battery (Abstract) comprised of a negative electrode [0013] having a thin film

of silicon oxide on the surface of a collector [0016] but is silent towards the film being formed by vacuum vapor deposition or sputtering.

Yamamoto teaches a lithium secondary battery where a silicon oxide film layer is formed by vapor deposition and sputtering for an anode layer [0100, 0101]. It would have been obvious to one of ordinary skill in the art at the time of the invention to form the silicon oxide layer of Hara using vapor deposition or sputtering because Yamamoto teaches this as preferable methods to form an amorphous layer with homogeneous film quality and an even film thickness.

Regarding claim 14, the silicon oxide layer of Hara in view of Yamamoto would inherently utilize a film forming material since a film is formed by a process of vapor deposition which also inherently provides a deposit to form the silicon oxide layer.

Regarding claim 19, Hara discloses the collector to be composed of various metals including copper and aluminum [0018].

5. Claims 3 and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. and Yamamoto et al. as applied to claims 1 and 12 above, and further in view of Shindo (US 5755940).

The teachings of Hara and Yamamoto as discussed above are herein incorporated.

Regarding claims 3 and 13, Yamamoto disclose vapor deposition and sputtering to form the silicon oxide layer but is silent towards the use of ion plating.

Shindo teaches ion plating as an equivalent method to sputtering and vacuum deposition to form a thin film layer which includes silicon oxide (4:44-5:8). It would have been obvious to one of ordinary skill in the art at the time of the invention to use ion plating to form the silicon oxide layer because Shindo teaches ion plating is an equivalent method to sputtering and vacuum deposition.

Response to Arguments

6. Applicant's arguments filed March 23, 2010 have been fully considered but they are not persuasive.

Applicant's principal arguments are:

(a) the instant application discusses standard ways to produce SiO_x powder allows for control over the O:Si molar ratio which are not discloses by Hara or Yamamoto,

(b) the O:Si molar ratio ranging from 0.1 to 1.00 provides intentional control over the O:Si ratio and provides unexpected results as shown in Table 1 of the Applicant's specifications,

(c) the majority component of the anode presented claims is SiO, which is the opposite of what is taught in Yamamoto.

In response to Applicant's arguments, please consider the following comments:

(a) The rejection as presented above meets the limitations as required in the claims. Furthermore, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies

(i.e., control over the oxidation state) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993),

(b) Examiner reiterates the claims do not require any intentional control over the O:Si ratio. The data as provided within Table 1 shows oxygen molar ratios ranging from 0.5 to 1.2 with corresponding initial efficiency and initial charge values. This data set does not provide any data as showing unexpected results to a specific oxygen molar ratio formed from various electrode formation methods since all the examples with varying oxygen molar ratio values essentially have the same initial efficiency percent and initial charge values,

(c) the Yamamoto reference is use to modify the teachings of Hara provided with sufficient motivations as discussed in the rejection. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang Han whose telephone number is (571) 270-5264. The examiner can normally be reached on Monday through Friday 8:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. H./
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/Dah-Wei D. Yuan/
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